

**FLORISTICS OF WETLAND PINE SAVANNAS IN THE BIG THICKET
NATIONAL PRESERVE, SOUTHEAST TEXAS**

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ABSTRACT

We describe the floristics and edaphic conditions of wetland pine savannas in southeastern Texas.

KEY WORDS: Wetland pine savanna, Big Thicket National Preserve, floristics, pitcher plants, Texas

INTRODUCTION

Southeast Texas is the western limit of once extensive wetland pine savannas (Bridges & Orzell 1989; Folkerts 1991; Harcombe *et al.* 1993; Marks & Harcombe 1981; Stout & Marion 1993; Streng & Harcombe 1982). In the West Gulf Coastal Plain (WGCP), wetland pine savanna is limited to coastal terraces of Allen, Calcasieu, Jefferson Davis, and Beauregard parishes in southwest Louisiana and to Jasper, Newton, Hardin, and Tyler counties in Texas (Bridges & Orzell 1989; Harcombe *et al.* 1993).

Wetland pine savanna is open, relatively flat, and is periodically inundated. Soils are saturated during the winter and spring. There often are scattered, stunted pines; the rich herbaceous layer consists of carnivorous species, grasses, sedges, and forbs. *Sphagnum* is abundant at some sites.

Wetland pine savanna is more technically referred to as Longleaf pine-Beakrush (*Pinus palustris* - *Rhynchospora*) Series (Diamond *et al.* 1987), or *Pinus palustris* - saturated woodland alliance (Weakley *et al.* 1998).

In the WGCP, wetland pine savanna is considered threatened (Texas Organization for Endangered Species 1992; Texas Natural Heritage Program 1995; Louisiana Natural Heritage Program 1993; Noss *et al.* 1995).

There are differing opinions on the community status of wetland pine savannas in the WGCP (Bridges & Orzell 1989; Louisiana Natural Heritage Program 1988; Sheridan 1991; Texas Natural Heritage Program 1995). Do wetland pine savannas represent one or two communities? Are the northern sites, which have pitcher plants, the same or a different community from those in the south, which lack pitcher plants? Are wetland pine savannas floristically different from hillside pitcher plant bogs (Bridges & Orzell 1989; MacRoberts & MacRoberts 1993; Nixon & Ward 1986)?

The purpose of this paper is twofold. First, we describe the floristics of representative wetland pine savanna in southeastern Texas. Second, using standard methods of assessing community differences, we compare two sites that have been designated as belonging to two different communities.

METHODS

In 1997 and 1998, we conducted a floristic inventory of two 3 ha sites on the Big Thicket National Preserve, Texas (Ajilvsgi 1979; Gunter 1993; Marks & Harcombe 1981; Watson 1979). Lance Rosier, the southernmost site, is in the Lance Rosier Unit about 8 km southwest of Kountze, Hardin County, near Little Rock Church (see Marks & Harcombe 1981 or Watson 1979 for maps of the Big Thicket National Preserve). This site is "classic" wetland pine savanna. It is about 29 km south of the natural extent of pitcher plants. The pimple mounds that occur at this site are excluded from our sample as belonging to an upland community.

The second site, Turkey Creek ("Pitcher Plant Trail"), is about 32 km north of the Lance Rosier savanna in the Turkey Creek Unit about 8 km southeast of Warren, Tyler County. This site has extensive stands of pitcher plants and occurs on the southernmost edge of the extent of pitcher plants in Texas.

Both sites are open. Turkey Creek has scattered shrubs and small longleaf pines. Lance Rosier has more woody vegetation, but the canopy is not more than twenty percent overall and most trees are stunted.

Except for mid-winter, we conducted floristic surveys monthly and visited each site thirteen times between July 1997 and November 1998. All species were identified and most collected. Voucher specimens will be deposited in TEX. At each site, we established two 1² plots to measure species richness. We follow Kartesz (1994) and Jones *et al.* (1997) for nomenclature in most instances (but see also Nesom [1994] for *Aster* and Brown & Gandhi [1989] for a discussion of *Hypericum*; we do not distinguish between *Nyssa sylvatica* Marsh. and *N. biflora* Walt., nor between *Persea borbonia* (L.) Spreng. and *P. palustris*).

The Turkey Creek site was burned in the winter of 1997-98 and has been burned regularly for many years (Geraldine Watson, pers. comm.). The Lance Rosier site

was burned in March 1983 and October 1990 (David McHugh, pers. comm.). Climatic information can be found in Marks & Harcombe (1981) and in Harcombe *et al.* (1993).

For comparative purposes, we made brief surveys of other wetland pine savannas in both Louisiana and Texas.

Soil samples were taken from the upper 15 cm and sent to A & L Laboratory, Memphis, Tennessee, for chemical analysis.

RESULTS

Table 1 lists the vascular plants found in the Lance Rosier and Turkey Creek study sites. Our collection number is included. Specimens without collection numbers were identified in the field.

Table 1. Plants of Lance Rosier and Turkey Creek wetland pine savannas (LR = Lance Rosier, TC = Turkey Creek).

SPHAGNACEAE

Sphagnum sp. [LR, TC 3504]

BLECHNACEAE

Woodwardia areolata (L.) T. Moore [LR]

W. virginica (L.) Sm. [LR, TC]

LYCOPODIACEAE

Lycopodiella appressa (Chapm.) R. Cranfill [LR 3734, TC 3506]

L. caroliniana (L.) P. Sermolli [TC]

OSMUNDACEAE

Osmunda cinnamomea L. [TC 3794]

O. regalis L. [TC 3793]

PINACEAE

Pinus palustris P. Mill. [LR, TC]

P. taeda L. [LR, TC]

AMARYLLIDACEAE

Hypoxis hirsuta (L.) Cov. [LR, TC 3720]

BURMANNIACEAE

Burmannia capitata (Walt.) Mart. [LR, TC]

CYPERACEAE

Carex glaucescens Ell. [LR]

- Dichromena latifolia* Baldw. ex Ell. [LR 3940, TC 3891]
Eleocharis microcarpa Torr. [LR 3852, TC 3937]
E. tuberculosa (Michx.) Roem. & Schult. [LR 3858, TC 3883]
Fuirena breviseta (Coville) Coville [LR 3480]
F. bushii Kral [TC 3511]
Rhynchospora caduca Ell. [LR 3540]
R. debilis Gale [LR 3851]
R. elliotii A. Dietr. [LR 3927, TC 3948]
R. filifolia A. Gray [LR 3485]
R. globularis (Chapm.) Small [LR 3864, TC 3934]
R. glomerata (L.) Vahl [LR 3646]
R. gracilentia A. Gray [LR 3488-C, TC 3496]
R. inexpansa (Michx.) Vahl [LR 3541]
R. oligantha A. Gray [TC 3495]
R. plumosa Ell. [LR 3861, TC 3885]
R. pusilla Chapm. ex M.A. Curtis [LR 3479]
R. rariflora (Michx.) Ell. [LR 3867, TC 3884]
Scleria georgiana Core [LR 3488, TC 3882]
S. reticularis Michx. [syn. = *S. muhlenbergii* Steud.] [LR 3667, TC 3499]

ERIOCAULACEAE

- Eriocaulon decangulare* L. [LR, TC]
Lachnocaulon anceps (Walt.) Morong. [TC]

IRIDACEAE

- Sisyrinchium atlanticum* Bickn. [LR 3875, TC]

LILIACEAE

- Alettris aurea* Walt. [LR 3639, TC 3629]
Schoenolirion croceum (Michx.) Wood [LR 3783, TC 3792]
Tofieldia racemosa (Walt.) B.S.P. [TC 3513]

ORCHIDACEAE

- Calopogon tuberosus* (L.) B.S.P. [LR 3924, TC 3945]
Spiranthes longilabris Lindl. [LR 4041]
S. praecox (Walt.) S. Wats. [LR 3863]
S. vernalis Engelm. & Gray [LR 3919]

POACEAE

- Anthraenantia rufa* (Ell.) Schultes [LR 3665, TC 3619]
Aristida palustris (Chapm.) Vasey [LR 3542, TC 3618]
Aristida purpurascens Poir. var. *virgata* (Trin.) Allred [TC 3498]
Axonopus fissifolius (Raddi) Kuhlm. [LR 3653-B, TC]
Coelorachis rugosa (Nutt.) Nash [LR 3637]
Dichanthelium acuminatum (Swartz) Gould & Clark var. *wrightianum* (Scribn.)
 Gould & Clark [LR 3385, TC]
D. consanguineum (Kunth) Gould & Clark [LR 3862]
D. scabriusculum (Ell.) Gould & Clark [LR 3482, TC 3938]
Eragrostis refracta (Muhl.) Scribn. [LR 3654, TC 3623]
Erianthus giganteus (Walt.) Muhl. [LR]
Muhlenbergia capillaris (Lam.) Trin. [LR 3656]

- Panicum brachyanthum* Steud. [LR, TC 3634]
Panicum rigidulum Bosc. ex Nees var. *pubescens* (Vasey) Lelong [LR 3732, TC]
Panicum tenerum Bey. ex Trin. [LR 3487, TC]
Panicum verrucosum Muhl. [LR 3666, TC 3634-B]
Panicum virgatum L. [LR]
Paspalum floridanum Michx. [TC 3626]
Paspalum laeve Michx. [LR 3663]
Paspalum plicatulum Michx. [LR, TC]
Paspalum praecox Walt. [LR 3731, TC 3719]
Schizachyrium scoparium (Michx.) Nash [LR, TC]
Tridens ambiguus (Ell.) Schultes [LR 3544, TC 3620]
T. strictus (Nutt.) Nash [LR 3722]

SMILACACEAE

- Smilax laurifolia* L. [LR, TC 3632]

XYRIDACEAE

- Xyris ambigua* Bey. ex Kunth [LR, TC 3631]
X. baldwiniana Schultes [TC 3879]
X. caroliniana Walt. [LR, TC]
X. difformis Chapm. var. *difformis* [LR 3657]
X. louisianica Bridges & Orzell [LR 3535, TC 3501]
X. torta Sm. [TC 3946]

ACERACEAE

- Acer rubrum* L. [LR, TC]

APIACEAE

- Centella erecta* (L.f.) Fern. [LR, TC]
Eryngium integrifolium Walt. [LR, TC 3507]
Oxypolis filiformis (Walt.) Britt. [LR 3478, TC]
O. rigidior (L.) Raf. [TC]
Ptilimnium capillaceum (Michx.) Raf. [LR, TC]

AQUIFOLIACEAE

- Ilex coriacea* (Pursh) Chapm. [LR, TC 3892]
I. opaca Ait. [LR]
I. vomitoria Ait. [LR, TC]

ASCLEPIADACEAE

- Asclepias longifolia* Michx. [LR 3874, TC]

ASTERACEAE

- Arnoglossum ovatum* (Walt.) H.E. Robins. [LR, TC 3508]
Aster dumosus L. [LR 3648, TC 3743]
Boltonia diffusa Ell. [LR 3652, TC 3509]
Chaptalia tomentosa Vent. [LR 3733, TC 3624]
Coreopsis linifolia Nutt. [LR 3662, TC 3627]
Eupatorium leucolepis (DC.) Torrey & Gray [LR 3641, TC]
E. rotundifolium L. [LR, TC]
Helenium drummondii H. Rock [LR 3784, TC 3786]

- Helianthus angustifolius* L. [LR 3735]
Liatris acidota Engelm. & Gray [LR 4005, TC]
L. pycnostachya Michx. [LR 3648, TC]
Marshallia graminifolia (Walt.) Small [LR 3378, TC 4006]
Pityopsis graminifolia (Michx.) Nutt. [TC 3715]
Pluchea rosea Godfrey [LR 3653, TC]

CAMPANULACEAE

- Lobelia flaccidifolia* Small [LR 3920]
L. reverchonii B.L. Turner [LR, TC]

CLUSIACEAE

- Hypericum crux-andreae* (L.) Crantz [LR 3389]
H. fasciculatum Lam. [LR 4001, TC 3502]
H. hypericoides (L.) Crantz [LR, TC]

CYRILLACEAE

- Cyrilla racemiflora* L. [LR, TC 3505]

DROSERACEAE

- Drosera brevifolia* Pursh [LR 3781, TC 3789]
D. capillaris Poir. [LR 3860, TC 3889]

FABACEAE

- Mimosa quadrivalvis* L. var. *hystericina* (Small) Barneby [LR 3660]
Tephrosia onobrychoides Nutt. [LR]

GENTIANACEAE

- Bartonia verna* (Michx.) Muhl. [TC 3757]
Sabatia gentianoides Ell. [LR 3635, TC 4007]

HALORAGIDACEAE

- Proserpinaca pectinata* Lam. [LR 3474]

HAMAMELIDACEAE

- Liquidambar styraciflua* L. [LR, TC]

LAMIACEAE

- Hyptis alata* (Raf.) Shinnars [LR 3484, TC 3625]
Scutellaria integrifolia L. [LR 3876, TC 3881]

LAURACEAE

- Persea borbonia* (L.) Spreng. [LR, TC]

LENTIBULARIACEAE

- Pinguicula pumila* Michx. [LR 3761, TC 3790]
Utricularia subulata L. [LR, TC 3893]

LINACEAE

- Linum medium* (Planch.) Britt. [LR 3546, TC]

LOGANIACEAE

- Cynoctonum sessilifolium* (Walt.) St. Hil. [LR 3483, TC 3510]
Gelsemium sempervirens (L.) St. Hil. [LR, TC]

MAGNOLIACEAE

- Magnolia virginiana* L. [LR, TC]

MELASTOMATACEAE

- Rhexia lutea* Walt. [LR 3388, TC 3944]
R. mariana L. [LR 3489, TC 3942]

MYRICACEAE

- Myrica cerifera* L. [LR, TC]
M. heterophylla Raf. [LR, TC]

NYSSACEAE

- Nyssa sylvatica* Marsh. [LR, TC]

ONAGRACEAE

- Ludwigia hirtella* Raf. [LR]
L. linearis Walt. [LR 3538]
L. pilosa Walt. [LR, TC 3500]

POLYGALACEAE

- Polygala cruciata* L. [TC 3943]
P. mariana P. Mill. [LR 3726, TC]
P. ramosa Ell. [LR 3877, TC]

ROSACEAE

- Aronia arbutifolia* (L.) Pers. [TC 3759]

RUBIACEAE

- Diodia virginiana* L. [LR 3475, TC]

SARRACENIACEAE

- Sarracenia alata* Wood. [TC]

SCROPHULARIACEAE

- Gratiola brevifolia* Raf. [LR 3916, TC 3936]

VIOLACEAE

- Viola lanceolata* L. [LR 3762, TC 3787]
V. primulifolia L. [TC 3788]

There were 117 species, 76 genera, and 40 families at the Lance Rosier site. There were 106 species, 75 genera, and 41 families at the Turkey Creek site. The Sorensen Index of Similarity (Sorensen 1948) between Lance Rosier and Turkey Creek is 79, which falls into the normal range of variation for different samples of the same community type. The two 1 m² plots at Turkey Creek had 20 and 24 species; the two 1 m² plots at Lance Rosier had 19 and 21 species, indicating a rich, diverse flora.

Larry Brown (pers. comm.) informs us that *Spiranthes brevilabris* Lind. var. *floridana* (Wherry) Luer, which we did not find in our Lance Rosier study plot, occurs in the immediate area (Brown & Liggio 20418 [SBSC]). It is rare throughout its range and is known from only a few locations in Texas (L.E. Brown pers. comm., J. Liggio pers. comm.).

Table 2 gives information on soil samples from the Lance Rosier and Turkey Creek sites.

Table 2. Soils of Lance Rosier and Turkey Creek study sites.

Sample	pH	Exchangeable Ions (ppm)				OM%
		P	K	Ca	Mg	
Lance 1	5.3	7	5	179	39	0.9
Lance 2	5.0	4	5	154	35	0.5
Turkey 1	4.4	8	8	111	22	1.5
Turkey 2	4.8	6	7	112	24	1.5

The soils of both the Lance Rosier and Turkey Creek sites are acidic, low nutrient, and non-organic.

DISCUSSION

Although the main purpose of this study was to gather basic information on the floristic composition of wetland pine savannas, we were interested also in determining whether or not there was a significant difference between the floras of southern and northern sites. There has been some discussion that savannas/bogs that have pitcher plants, like Turkey Creek, are a different plant community from savannas like Lance Rosier that lack pitcher plants: the former are classified as pitcher plant bogs and the latter as wetland pine savannas (Sheridan 1991). However, the question had not been addressed quantitatively (Harcombe *et al.* 1993).

Streng & Harcombe (1982) list the plants of a wetland pine savanna on the Hickory Creek Savanna Unit 9 km southwest of our Turkey Creek site. Even though many plants were identified only to genus, it is clear that the Hickory Creek and Turkey Creek sites are virtually identical floristically (pers. obs.).

The Lance Rosier and Turkey Creek sites are not unique in the area. Near both are other wetland pine savannas with the same flora. In the vicinity of Turkey Creek are Hyatt Bog, Hickory Creek Savanna, and Kirby State Forest with its degraded wetland pine savanna. Geraldine Watson, a lifelong student of the Big Thicket, recounts many savannas that have now been destroyed.

The differences and similarities we have found in this study also hold for southwestern Louisiana. On the basis of incomplete surveys, the flora is essentially the same in what are called pitcher plant bogs and wetland pine savannas. In Beauregard Parish and northern Calcasieu Parish, pitcher plants occur. Farther south this species drops out of the flora, but the same basic community continues.

Needless to add, for a complete understanding of the communities in the longleaf pine region of southeastern Texas and southwestern Louisiana, a much larger sample of sites from a larger part of the region would be desirable, as would additional information on hydrology, soils, geology, topographic position, importance values, cover values, and other factors that may be used to characterize sites. The fact that we found a strong similarity in flora between the Lance Rosier and Turkey Creek sites does not negate the fact that they will differ in some manner and thereby be recognizable as distinct at some level. For example, Bridges & Orzell (1989) found differences between hillside bogs and wetland pine savannas in species importance values and herbaceous species composition. We also have found such differences, not only between wetland pine savannas and hillside bogs, but among hillside bogs in different parts of the WGCP. For example, differences are apparent in Natchitoches Parish, and Vernon and Beauregard parishes. While such species as *Rudbeckia scabrifolia* L.E. Brown, *Liatris acidota*, *Viola lanceolata*, *Dichromena latifolia*, *Hyptis alata*, *Sarracenia alata*, *Schoenolirion croceum*, and *Sabatia macrophylla* Hook. are uncommon or absent in northern bogs, they are common in southern ones. These observations point to the need for thorough quantification (Harcombe *et al.* 1993:86). Important would be complete site specific censuses of WGCP bogs and wetland pine savannas on a north-south and east-west axis. Such concerns underline the fact that much research needs to be done on plant communities in the longleaf pine region of the WGCP and attest to the perduring problem in ecology and conservation biology of defining communities and developing community classifications (MacRoberts & MacRoberts 1998b).

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